

IN THE CLAIMS

Please amend the following claims by substituting the following clean copies with the same claim numbers.

Clean version of the Claim changes

39. (Amended) An optical scanner comprising:

a housing having a substantially vertical surface containing a first aperture and a substantially horizontal surface containing a second aperture;

a single laser which produces a laser beam within the housing;

a plurality of groups of pattern mirrors;

a polygon spinner having mirrored facets receiving the laser beam and rotating to reflect the laser beam in a plurality of directions as the spinner rotates to cause the beam to strike at least certain of the pattern mirrors to produce a plurality of scanning beams including a first group of scanning beams, a second group of scanning beams, and a third group of scanning beams;

a first group of pattern mirrors for reflecting the first group of scanning beams through the first aperture to produce a first scan pattern consisting of a plurality of intersecting scan lines and for reflecting the second group of scanning beams through the first aperture to produce a second

scan pattern consisting of a plurality of intersecting scan lines; and

3. C a second group of pattern mirrors for reflecting the third group of scanning beams through the second aperture to produce a third scan pattern consisting of a plurality of intersecting scan lines;

wherein multiple facets of the polygon spinner direct the laser beam alternately multiple times, during each rotation of the polygon spinner, to at least one pattern mirror of the first group and then to at least one pattern mirror of the second group, to reflect the laser beam alternately through the first and second apertures multiple times as the polygon spinner rotates a single rotation.

43. (Amended) An optical scanner comprising:

C^A a housing having a substantially vertical surface containing a first aperture and a substantially horizontal surface containing a second aperture;

a single laser which produces a laser beam within the housing;

a plurality of groups of pattern mirrors;

a polygon spinner having mirrored facets for reflecting the laser beam in a plurality of directions as the spinner rotates to produce a plurality of scanning beams

including a first group of scanning beams, a second group of scanning beams, and a third group of scanning beams; and

a first group of pattern mirrors including a first, second and third subsets of pattern mirrors for reflecting the first group of scanning beams through the first aperture to produce a first scan pattern consisting of a plurality of intersecting scan lines,

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a second group of pattern mirrors including a first, second and third subsets of pattern mirrors reflecting the second group of scanning beams through the first aperture to produce a second scan pattern consisting of a plurality of intersecting scan lines, each of the subsets of the second group having multiple mirrors; and

a third group of pattern mirrors for reflecting the third group of scanning beams through the second aperture to produce a third scan pattern consisting of a plurality of intersecting scan lines;

the first group of scanning beams reflecting off the first subset of pattern mirrors of the first group to the second subset thereof, then reflecting off said second subset to the third subset thereof, and then off said third subset out the first aperture,

the second group of scanning beams reflecting off the first subset of pattern mirrors of the first group to the

second subset thereof, then reflecting off said second subset to the third subset thereof, and then off said third subset out the first aperture,

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at least one of the mirrors of the first group of pattern mirrors being positioned adjacent the first aperture to reflect certain of the first group of scanning beams outwardly through the first aperture to scan the side of an article,

at least one of the mirrors of the second group of pattern mirrors being positioned adjacent the first aperture and angled to reflect certain of the first group of scanning beams outwardly and laterally through the first aperture toward the leading side of the article, and at least one positioned adjacent the first aperture and angled to reflect certain of the first group of scanning beams outward and laterally through the first aperture to scan the trailing side of the article, and

at least one of the mirrors of the first group of pattern mirrors being positioned adjacent the first aperture and angled to reflect certain of the first group of scanning beams downwardly and outwardly through the first aperture to scan the top of an article.

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46. (Amended) A method of scanning an item having a bar code from multiple directions, comprising the steps of

generating laser light;

providing a single multi-faceted mirrored polygon in a path of said laser light;

rotating the mirror polygon and directing the laser light at the polygon, as it is rotating, to produce a single laser beam reflected off each facet of the polygon;

generating a first group of scanning beams, a second group of scanning beams, and a third group of scanning beams by reflecting said laser light off said mirror polygon and then reflecting the laser beam off groups of pattern mirrors;

generating the first group of scanning beams comprises directing the laser beam to a first set of pattern mirrors, reflecting the beam from those mirrors to a second set of pattern mirrors and reflecting the beam from those mirrors to at least one additional pattern mirror;

directing said first group of scanning beams from said at least one additional mirror through a first transparent member oriented in a first plane to scan a surface of the item from one orthogonal direction to scan at least the top of an item;

generating the second plurality of scanning beams comprises directing the laser beam to a third set of pattern mirrors, reflecting the beam from those mirrors to a fourth

5
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set of pattern mirrors and reflecting the beam from those mirrors to a fifth set of pattern mirrors;

directing said second group of scanning beams from at least one mirror of said fifth set of mirrors directly outwardly through the first transparent member oriented in the first plane to scan one side of the item and from further mirrors of said fifth set of mirrors diagonally outwardly through the first transparent member oriented in the first plane to scan the item from a diagonal direction to scan the leading and trailing sides of the item; and

generating the third plurality of scanning beams comprises directing the single laser beam to a sixth set of pattern mirrors, reflecting the beam from those mirrors to a seventh set of pattern mirrors and reflecting the beam from the mirrors of the seventh set,

directing said third group of scanning beams from said seventh set of mirrors through a second transparent member oriented in a second plane orthogonal to said first plane to scan the item from another orthogonal direction to scan at least the bottom of the item.

47.(Amended) A method of scanning as in Claim 46 wherein

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the first group of scanning beams is directed through the first transparent window in an outwardly and downwardly direction to scan the top of an item, and

the second group of scanning beams is directed through the first transparent window in at least a diagonally rearward direction and a diagonally forward direction to scan the leading and trailing sides of an item.

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48.(Amended) A method of scanning as in claim 47 wherein

certain of the beams of the second group are directed through the first transparent window in a diagonally rearward direction to scan the leading side of an item, other beams of the second group are directed through the first transparent window in a diagonally forward direction to scan the trailing side of an item and other beams of the second group are directed outwardly through the first transparent window in a generally lateral direction to scan the side of the item.

53.(Amended) A method of scanning as in Claim 52 wherein

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the first group of scanning beams is directed through the first transparent window in an outwardly and downwardly direction to scan the top of an item, and

the second group of scanning beams is directed through the first transparent window in a diagonally rearward direction to scan the leading side of an item.

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54.(Amended) A method of scanning as in claim 53 wherein

certain of the beams of the second group are directed through the first transparent window in a diagonally rearward direction to scan the leading side of an item, and other beams of the second group are directed through the first transparent window in a diagonally forward direction to scan the trailing side of an item.

Add the following claims:

59.(new) An optical scanner comprising:

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(a) a housing including a substantially vertical surface containing a first aperture and a substantially horizontal surface containing a second aperture;

(b) a laser diode for producing a single laser beam;

(c) an optical transceiver for passing the single laser beam and for collecting reflected light from an article having a bar code label to be scanned;

(d) a spinner having a plurality of sides oriented at different angles with respect to a predetermined reference for reflecting the single laser beam in a plurality of directions to produce a plurality of scanning beams, and for directing light reflected from the article to the optical transceiver; and

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(e) a plurality of pattern mirrors for reflecting a first group of the scanning beams in a substantially horizontal direction through the first aperture, a second group of the scanning beams in a substantially downward diagonal direction through the first aperture, and a third group of the scanning beams in a substantially vertical direction through the second aperture and including

(f) a first group of mirrors for reflecting the laser beam from the spinner, a second group of mirrors for reflecting the scanning beam from the first group of mirrors, and a third group of mirrors for reflecting the scanning beam from some of the mirrors in the second group of mirrors; and

(g) a photodetector for generating signals representing the intensity of the light reflected from the article;

(h) the mirrors of the first group being divided into a first and second set,

(i) the first set being positioned closer to the spinner than the second set,

(j) the spinner directing the laser beam between the mirrors of the first set to strike the mirrors of the second set.

60.(new) An optical scanner comprising:

(a) a housing including a substantially vertical surface containing a first aperture and a substantially horizontal surface containing a second aperture;

(b) a laser diode for producing a single laser beam;

(c) an optical transceiver for passing the single laser beam and for collecting reflected light from an article having a bar code label to be scanned;

(d) a spinner having a plurality of sides oriented at different angles with respect to a predetermined reference for reflecting the single laser beam in a plurality of directions to produce a plurality of scanning beams, and for directing light

7
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reflected from the article to the optical transceiver; and

(e) a plurality of pattern mirrors for reflecting a first group of the scanning beams in a substantially horizontal direction through the first aperture, a second group of the scanning beams in a substantially downward diagonal direction through the first aperture, and a third group of the scanning beams in a substantially vertical direction through the second aperture and including

(f) a first group of mirrors for reflecting the laser beam from the spinner, a second group of mirrors for reflecting the scanning beam from the first group of mirrors, and a third group of mirrors for reflecting the scanning beam from some of the mirrors in the second group of mirrors; and

(g) a photodetector for generating signals representing the intensity of the light reflected from the article;

(h) the spinner having an even number of facets greater than two, each of the facets being at different angles with respect to a predetermined axis, and the facets opposite one another being

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disposed at angles closer to one another than to any of the other facets.

61.(new) As in claim 60, wherein the spinner has four facets.

62.(new) A method for scanning an article having a bar code label with minimal article orientation comprising the steps of:

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- (a) generating a single laser beam;
 - (b) providing a polygon spinner including a plurality of mirrored facets;
 - (c) reflecting the single laser beam from the polygon spinner at a plurality of pattern mirrors within a scanner housing to produce first, second and third groups of scan lines from the single laser beam;
 - (d) reflecting the first group of scan lines from the pattern mirrors downwardly through a vertical aperture within the scanner housing to produce a first scan pattern consisting of a plurality of intersecting scan lines,
 - (e) reflecting the second group of scan lines from the pattern mirrors through said vertical aperture within the scanner housing to produce a

second scan pattern consisting of a plurality of intersecting scan lines,

(f) reflecting the third group of scan lines through a horizontal aperture within the scanning housing to produce a third scan pattern consisting of a plurality of intersecting scan lines; and

(g) arranging the spinner to have an even number of facets, with the facets being at different angles with respect to a predetermined axis and with the facets opposite to one another in the spinner being at angles closer to one another than to any of the other facets.

7. Claim